SAFETY DATA SHEET

Preparation Printed: November 25, 2016
Version: 4
Revision date: November 2, 2022
Regulation: In accordance with Commission Regulation (EU) CLP 1272/2008

1. IDENTIFICATION OF THE SUBSTANCE AND OF THE COMPANY

1.1 Product identifier

Product name: KONNATE X-100
EC No.: 222-852-4
REACH Registration No.: 01-2119946318-31-0000
CAS No.: 3634-83-1

1.2 Relevant identified uses of the substance or mixture and uses advised against

1.2.1 Identified Uses

- Manufacture
- Formulation: Use for formulation of preparations (industrial)
- Uses at industrial sites: Industrial use in formulations, Manufacture of (construction) sealants, using XDI (reacting upon use), Industrial use as an intermediate/monomer, Industrial end use

1.2.2 Recommended use

- Lens, ink binder, glue, paint, lamination, ext.

1.2.3 Restrictions on use

- Do not use for purposes other than those recommended.

1.3 Details of the supplier of the safety data sheet

1.3.1 Manufacturer

Company name: TDI Plant, Hanwha Solutions Co, Ltd.
Address: 46-47, Yeosusandan 2-ro, Yeosu-si, Jeollanam-do, Korea
Prepared by: TDI Production Team
Contact Telephone: +82-61-688-4800

1.3.2 Supplier & Distributor

Company name: Hanwha Solutions Co, Ltd.
Address: Hanwha Bldg., 86, Cheonggyecheon-ro, Jung-gu, Seoul, Korea
Prepared by: FM Sales Team
Contact Telephone: +82-2-729-2700

1.4 Emergency telephone number

Emergency Telephone: +82-2-729-2700

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 (CLP)

Physical / Chemical Hazards: Not classified

Health Hazards:
Acute toxicity (inhalation: vapors): Category 2
Skin corrosion/irritation: Category 2
Eye Damage/irritation: Category 1
Skin sensitization: Category 1

Environmental Hazards: Not classified

2.2 Label elements

o Hazard pictograms:

o Signal word: Danger

o Hazard statement:

H315 Causes skin irritation
H317 May cause an allergic skin reaction
H318 Causes serious eye damage
H330 Fatal if inhaled

o Precautionary statements :

- **Precaution**:

P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 Wash parts of the body thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P272 Contaminated work clothing should not be allowed out of the workplace.
P280 Wear protective gloves/eye protection/face protection.
P284 [In case of inadequate ventilation] wear respiratory protection.

- **Treatment**:

P302+P352 IF ON SKIN: Wash with plenty water.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P354+P338 IF IN EYES: Immediately rinse with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a posion center or doctor/physician
P320 Specific treatment is urgent.
P321 Specific treatment.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
P362+P364 Take off contaminated clothing and wash it before reuse.

- **Storage**:

P403+P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.

- **Disposal**:

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

2.3 Other hazards

- **Additional precautionary statements:** Not available
- **National Fire Protection Association (NFPA):**

Health: 3
Flammability: 1
Reactivity: Not available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS No.	EC No.	Conc. / %	Classification according to 1272/2008/EC	Registration No.
Benzene, 1,3-bis(isocyanatomethyl)	3634-83-1	222-852-4	100	Not classified	Not applicable

4. FIRST AID MEASURES

4.1 Description of first aid measures

4.1.1 General information:
Remove soiled or soaked clothing immediately, do not allow to dry.
Adhere to personal protective measures when giving first aid.
Clean body thoroughly (Bad, shower).

4.1.2 Following inhalation:
Immediately call a poison center or doctor/physician.
If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop.

4.1.3 Following skin contact:
If skin irritation or rash occurs: Get medical advice/attention.
Take off contaminated clothing and wash before reuse.
For hot product, immediately immerse in or flush the affected area with large amounts of cold water to dissipate heat.
Call emergency medical service.
Remove and isolate contaminated clothing and shoes.
In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
For minor skin contact, avoid spreading material on unaffected skin.

4.1.4 Following eye contact:
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Call emergency medical service.

4.1.5 Following ingestion:
Call emergency medical service.
Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

4.1.6 Self-protection of the first aider:
First aider: Pay attention to self-protection!

4.2 Most important symptoms and effects, both acute and delay Acute effects:

- Symptoms and effects: Not known

4.3 Indication of immediate medical attention and notes for physician

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media

- Suitable extinguishing media: alcohol foam, carbon dioxide, or water spray
- Use dry sand or earth to smother fire.
- Unsuitable extinguishing media: Not available

5.2 Specific hazards arising from the substance or mixture

- Thermal decomposition products: nitrogen oxides, carbon monoxide, hydrogen cyanide gas
- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning.
- Containers may explode when heated.
- Some of these materials may burn, but none ignite readily.
- Non-combustible, substance itself does not burn but may decompose upon heating, then produce corrosive and/or toxic fumes.

5.3 Advice for firefighters

- Rescuers should put on appropriate protective gear.
- Evacuate area and fight fire from a safe distance.
- Substance may be transported in a molten form.
- Dike fire-control water for later disposal; do not scatter the material.
- Move containers from fire area if you can do it without risk.
- Fire involving Tanks; Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Fire involving Tanks; Cool containers with flooding quantities of water until well after fire is out.
- Fire involving Tanks; Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- Fire involving Tanks; Always stay away from tanks engulfed in fire.
- Fire involving Tanks; For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Clean up spills immediately, observing precautions in Protective Equipment section.
- Isolate hazard area.
- Keep unnecessary and unprotected personnel from entering.
- Eliminate all ignition sources.
- Stop leak if you can do it without risk.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Cover with plastic sheet to prevent spreading.
- Please note that there are materials and conditions to avoid.

6.2 Environmental precautions

- Prevent entry into waterways, sewers, basements or confined areas.

6.3 The methods of purification and removal

- Absorb spills with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Reduce dust and prevent scattering by moistening with water.
- Absorb the liquid and scrub the area with detergent and water.

6.4 Reference to other sections

- If appropriate, Section 8 and 13 shall be referred to.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

- Avoid breathing dust/fume/gas/mist/vapours/spray.
- Wash thoroughly after handling.
- Use only outdoors or in a well-ventilated area.
- Contaminated work clothing should not be allowed out of the workplace.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Use carefully in handling/storage.
- Loosen closure cautiously before opening.
- Avoid prolonged or repeated contact with skin.
- Please note that there are materials and conditions to avoid.
- Please work with reference to engineering controls and personal protective equipment.

7.2 Conditions for safe storage, including any incompatibilities

- Store in a well-ventilated place. Keep container tightly closed
- Empty drums should be completely drained, properly bunged, and promptly returned to a drum

reconditioner, or properly disposed of.

7.3 Specific end use(s)

- Recommendations shall relate to the identified use(s) referred to in subsection 1.2 and be detailed and operational.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Occupational Exposure limits

- **o EU regulation:** Not available
- **o U.S regulation:** Not available
- **o ACGIH:** Not available
- **o Biological exposure index:** Not available
- **o Others:** Not available
- **o DNELs, PNECs:**

Exposure route of relevance	**DNELs, DMELs, PNECs**							
	Workers				General population			
	Long term, Local effects	Long term, Systemic effects	Short term, Local effects	Short term, Systemic effect	Long term, Local effects	Long term, Systemic effects	Short term, Local effects	Short term, Systemic effect
Human: oral (mg/kg bw/day)	Not available	Not available	Not available	Not available	Not available	0.42	Not available	No hazard identified
Human: inhalation (mg/m^3)	high hazard (no threshold derived)	2.45	6.5	32.8	high hazard (no threshold derived)	0.72	3.9	29.4
Human: dermal (mg/kg bw/day)	high hazard (no threshold derived)	0.35	high hazard (no threshold derived)	No hazard identified	high hazard (no threshold derived)	0.21	high hazard (no threshold derived)	No hazard identified
Environment: water	9.7 µg/L (freshwater), 0.97 µg/L (marine water)							
Environment: air	No hazard identified							
Environment: soil	3.7 µg/kg soil dw							
Environment: sediment	47 µg/kg sediment dw (freshwater), 4.7 µg/kg sediment dw (marine water)							
Environment: STP	1.59 mg/L							
Environment: Predators	No potential for bioaccumulation							

8.2 Exposure controls

Appropriate engineering controls:

- Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.
- Facilities for storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
- If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the recommended exposure limit.

Individual protection mea3sures, such as personal protective equipment:

Respiratory protection:

- Wear European Standard EN 149 approved full or half face piece (with goggles) respiratory protective equipment when necessary.

Eye protection:

- Wear breathable safety goggles to protect from particulate material causing eye irritation or other disorder.
- An eye wash unit and safety shower station should be available nearby work place.

Hand protection:
- Wear appropriate protective gloves by considering physical and chemical properties of chemicals.

Body protection:
- Wear appropriate protective clothing by considering physical and chemical properties of chemicals.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	
Description:	Liquid
Color:	Light yellow
Odor:	Not available
Odor threshold:	Not available
pH:	Not available
Melting point/freezing point:	-7℃
Initial boiling point and boiling range:	293.00 to 294.00 °C. @ 760.00 mm Hg (est)
Flash point:	168 ℃ (Pensky-Martens Closed Cup) (ASTM D93-20)
Evaporation rate:	Not available
Flammability (solid, gas):	Not applicable
Upper/lower flammability or explosive limits:	Not available
Vapor pressure:	0.021 Pa (20 °C)
Vapor density:	1.2 g/cm^3 (20 °C)
Relative density:	Not available
Solubility(ies):	Not available
Partition coefficient: n-octanol/water:	3.00 (25°C)
Auto-ignition temperature:	470 °C (≥ 1,015.1 - ≤ 1,021.9 hPa)
Decomposition temperature:	175°C (OECD TG 103)
Viscosity:	6 mPas (25 °C)
Explosive properties:	Not available
Oxidizing properties:	Not available
Molecular weight:	188.18 g/mol
Specific gravity:	1.2 g/cm^3 (20 °C)
Particle Size (Polymer compound)	Not applicable
Self-accelerated decomposition temperature (Polymer compound)	Not applicable

9.2 Other information: Not available

10. STABILITY AND REACTIVITY

10.1 Reactivity/Chemical stability/Possibility of hazardous reactions
- May decompose at high temperatures into forming toxic gases.
- Some of these materials may burn, but none ignite readily.
- Non-combustible, substance itself does not burn but may decompose upon heating, then produce corrosive and/or toxic fumes.

10.2 Conditions to avoid

- Keep away from heat/sparks/open flames/hot surfaces. – No smoking

10.3 Incompatible materials

- Combustibles, reducing agents

10.4 Hazardous decomposition products

- Material may produce irritating and highly toxic gases from decomposition by heat and combustion during burning.
- Corrosive and/or toxic fume
- Nitrogen oxides, carbon monoxide, hydrogen cyanide gas

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects	
(a) Acute toxicity	
Oral	Not classified
	· Rat, LD_{50} > 2,000 mg/kg bw
Dermal	Not classified
	· Rat, LD_{50} > 2,000 mg/kg bw
Inhalation	Category 2
	· Rat(male/female), inhalation: aerosol, LC_{50} = 0.35 mg/L air/4h
(b) Skin Corrosion/ Irritation	Category 2
	· As a result of skin corrosion/irritation test, it caused skin irritation (irritation score : ≥ 2.3).
(c) Serious Eye Damage/ Irritation	Category 1
	· As a result of severe eye damage/irritation test, irreversible corneal opacity, iritis, severe edema, and conjunctival hyperemia were observed.
(d) Respiratory sensitization	Not available
(e) Skin Sensitization	Category 1
	· As a result of skin sensitization test, a positive reaction was induced in 7 out of 8 animals.
(f) Carcinogenicity	Not classified
	· IARC, NTP, OSHA, ACGIH, EU CLP 1272/2008: not listed
(g) Mutagenicity	Not classified
	· *In vitro:* Bacterial Reverse Mutation Assay : negative · *In vitro:* Mammalian Chromosome Aberration Test: positive · *In vivo*: Micronucleus test : negative
(h) Reproductive toxicity	Not classified
	· Local effects were observed, but no maternal or offspring effects related to reproductive and developmental toxicity were observed.
	Not classified

(i) Specific target organ toxicity (single exposure)	· No consistent and identifiable toxic effects from a single exposure to the substance.
(j) Specific target organ toxicity (repeat exposure)	Not classified
	· As a result of repeated inhalation toxicity test, no consistent and identifiable toxic effects were observed for the substance.
(k) Aspiration Hazard	Not available
	· Viscosity: 6 m Pa s (25 °C)

12. ECOLOGICAL INFORMATION

12.1 Toxicity	
Acute toxicity	Not classified
	· Fish: 96h-LC_{50} = 120.9 mg XDI/L · Invertebrate: 48h-EC_{50} = 8.6 mg XDI/L · Algae: ErC_{50} = 43.5 mg XDI/L * As it rapidly changes to XDA (CAS No. 1477-55-0) in water, XDI does not apply to the aquatic hazard classification criteria.
Chronic toxicity	Not classified
12.2 Persistence and degradability	· BOD 0% degradation was observed after 28 days; not readily biodegradable
12.3 Bioaccumulative potential	· log P_{ow} = 2.9952 · BCF = 43.98 (estimated)
12.4 Mobility in soil	· K_{oc} = 401.1 (estimated)
12.5 Results of PBT and vPvB assessment	· Due to the properties of the material, it is not applicable to P & B, but XDI fulfils the T criterion for human health as XDI needs to be classified for acute toxicity (inhalation), skin irritation and eye corrosion.
12.6 Hazardous to the ozone layer	Not classified
12.7 Other adverse effects	Not available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

- Waste disposal according to directive 2008/98/EC, covering waste and dangerous waste.

13.1.1 Product/Packaging disposal

- No waste key number as per the European Waste Types List can be assigned to this product, since such classification is based on the (as yet undetermined) use to which the product is put by the consumer.
- The waste key number must be determined as per the European Waste Types List (decision on EU Waste Types List 2000/532/EC) in cooperation with the disposal firm/producing firm/official authority.

13.1.2 Waste treatment-relevant information

- Waste must be disposed of in accordance with directive 2008/98/EC.

13.1.3 Sewage disposal-relevant information:
- Release to the environment or sewage system is prohibited. Must be treated as hazardous waste.

13.1.4 Other disposal recommendations: Not available

14. TRANSPORT INFORMATION

14.1 UN No.: 2206

14.2 UN Proper shipping name: ISOCYANATES, TOXIC, N.O.S. (m-xylylene diisocyanate)

14.3 Transport Hazard class:
ADR: 6.1
IMDG: 6.1
ICAO/IATA: 6.1
RID: 6.1

14.4 Packing group: II

14.5 Environmental hazards: Not applicable

14.6 Special precautions for user
in case of fire: F-A
in case of leakage: S-A

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code: Not applicable

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulation/legislation specific for mixture
EU Regulatory Information
EU classification
EU 1272/2008(CLP)
Classification: Not classified
Risk phrases: Not applicable
Safety phrases: Not applicable
EU SVHC list: Not regulated
EU Authorization list: Not regulated
EU Restriction list: Not regulated

Foreign Inventory Status
- Korea management information: Existing Chemical Substance (KE-03244)
- U.S.A management information: Section 8(b) Inventory (TSCA): Present [PMN] (ACTIVE)
- Canada management information: Non-Domestic Substances List (NDSL): Present
- China management information: Inventory of Existing Chemical Substances (IECSC): Present (11924)
- Japan management information: Existing and New Chemical Substances (ENCS): Present ((3)-2216)
- Philippines management information: Inventory of Chemicals and Chemical Substances (PICCS): Present
- Taiwan management information: Taiwan Chemical Substance Inventory (TCSI): Present

15.2 Chemical safety assessment: Not available

16. OTHER INFORMATION

Product safety data sheet for prepared in accordance with Regulation (EU) 1272/2008

16.1 Indication of changes:
Preparation date: November 25, 2016
Version: 5
Revision date: November 2, 2022

16.2 Key literature reference and sources for data:

TSCA; http://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/searchbylist/search.do
EU Regulation 1272/2008
TOMES-LOLI; http://csi.micromedex.com/fraMain.asp?Mnu=0
UN Recommendations on the transport of dangerous goods 17th
IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; http://monographs.iarc.fr
ECHA CHEM; http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances
OECD SIDS; http://webnet.oecd.org/
HSDB; https://pubchem.ncbi.nlm.nih.gov/
EPA; http://www.epa.gov/iris
EPISUITE Program ver.4.1
NIOSH(The National Institute for Occupational Safety and Health)
ACGIH(American Conference of Governmental Industrial Hygienists)
National chemicals information systems; http://ncis.nier.go.kr
Management Agency-Korea dangerous material inventory management system;
http://hazmat.mpss.kfi.or.kr/material.do
K-REACH; K-REACH/registration-dossier
Boiling point; http://www.thegoodscentscompany.com

16.3 Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008(CLP):

Classification according to Regulation (EC) 1272/2008 (CLP)	Classification procedure
Acute toxicity (inhalation: vapors): Category 2	Calculated by ATEmix
Skin corrosion/irritation: Category 2	Limit concentration
Eye Damage/irritation: Category 1	Limit concentration
Skin sensitization: Category 1	Limit concentration

16.4 Abbreviations

EC_{50}: median effective concentration
LC_{50}: median lethal concentration
LD_{50}: median lethal dose
OEL: Occupational exposure limit
PBT: Persistent, bioaccumulative, toxic chemical
STEL: short-term exposure limit
TWA: time weighted average
vPvB: very persistent, very bioaccumulative chemical
EWC: the European Waste Code

16.5 Other

- Product should be handled, stored, and used in accordance with the generally accepted industrial hygiene practices and in conformity with all the applicable legal regulations.
- The information provided herein is based on the knowledge possessed at this present time from the view point of safety requirements.
- It should, therefore, not be construed as guaranteeing specific properties.